

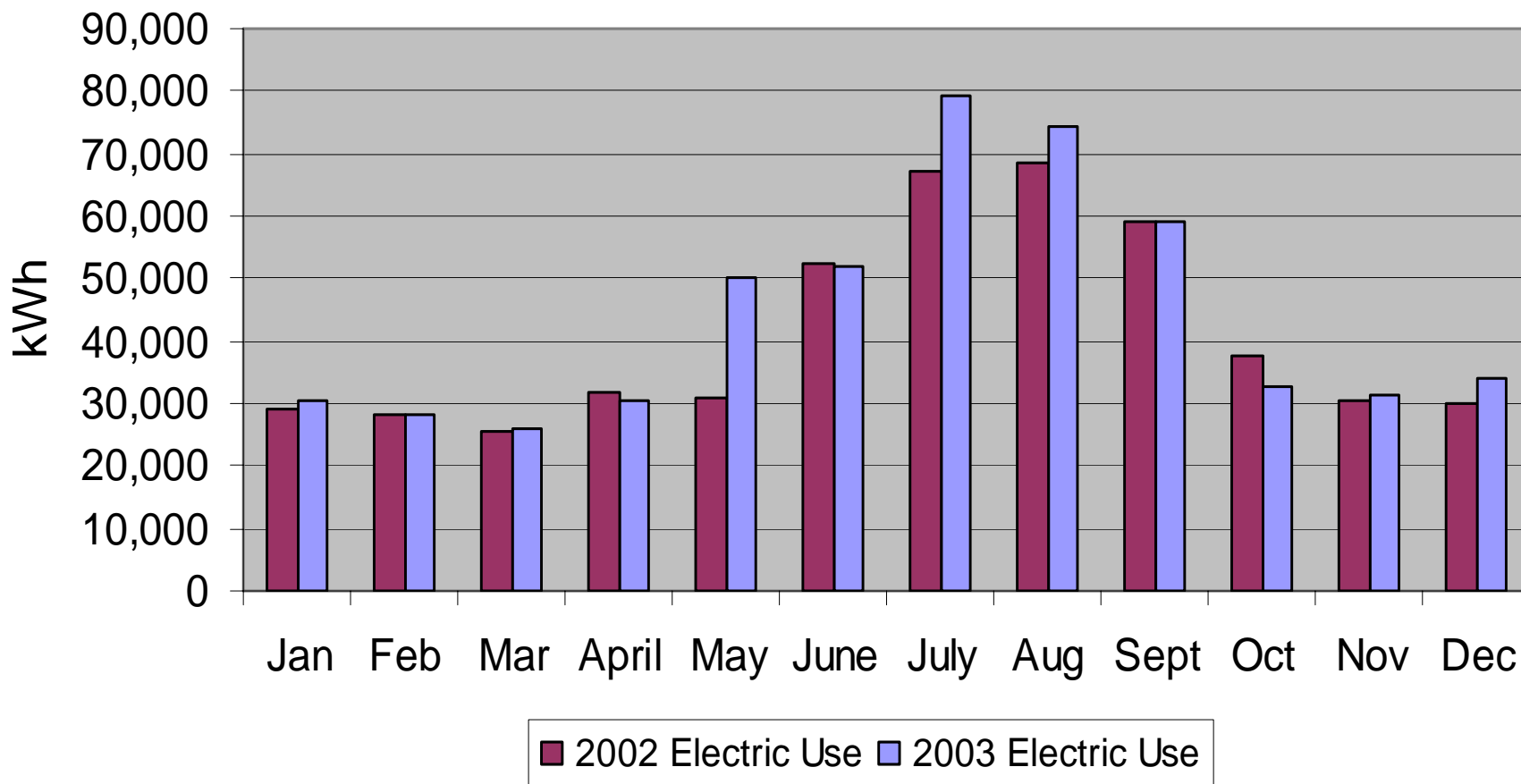
# Energy Audits and Feasibility Studies

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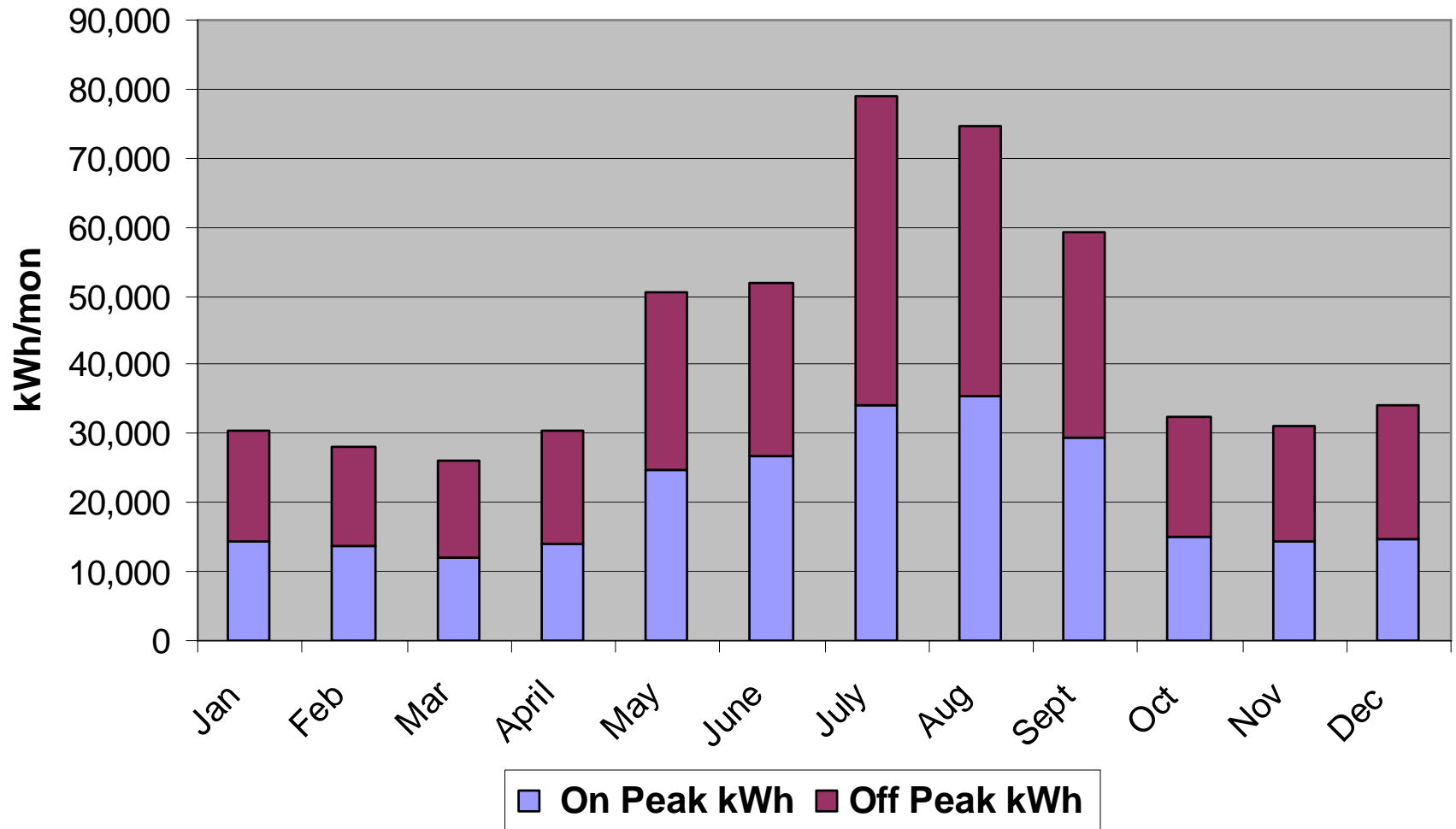
# Energy Audit

- Generally focus on electrical energy
- When the energy audit is a prelude to a feasibility study for a anaerobic digestion, fossil fuels must be included

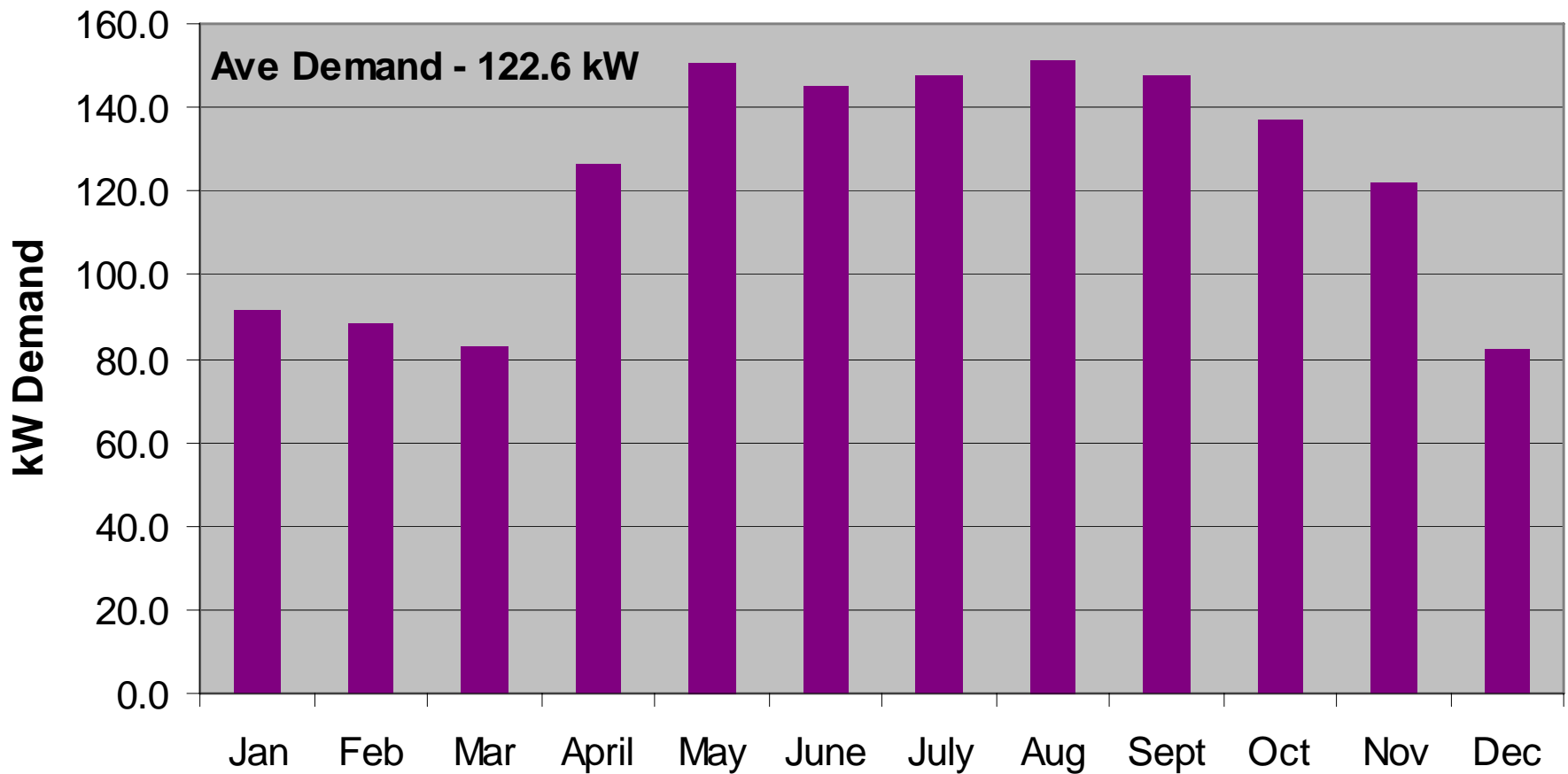
## Farm Annual Electric Use



## Farms - On / Off Peak Electric Use Profile

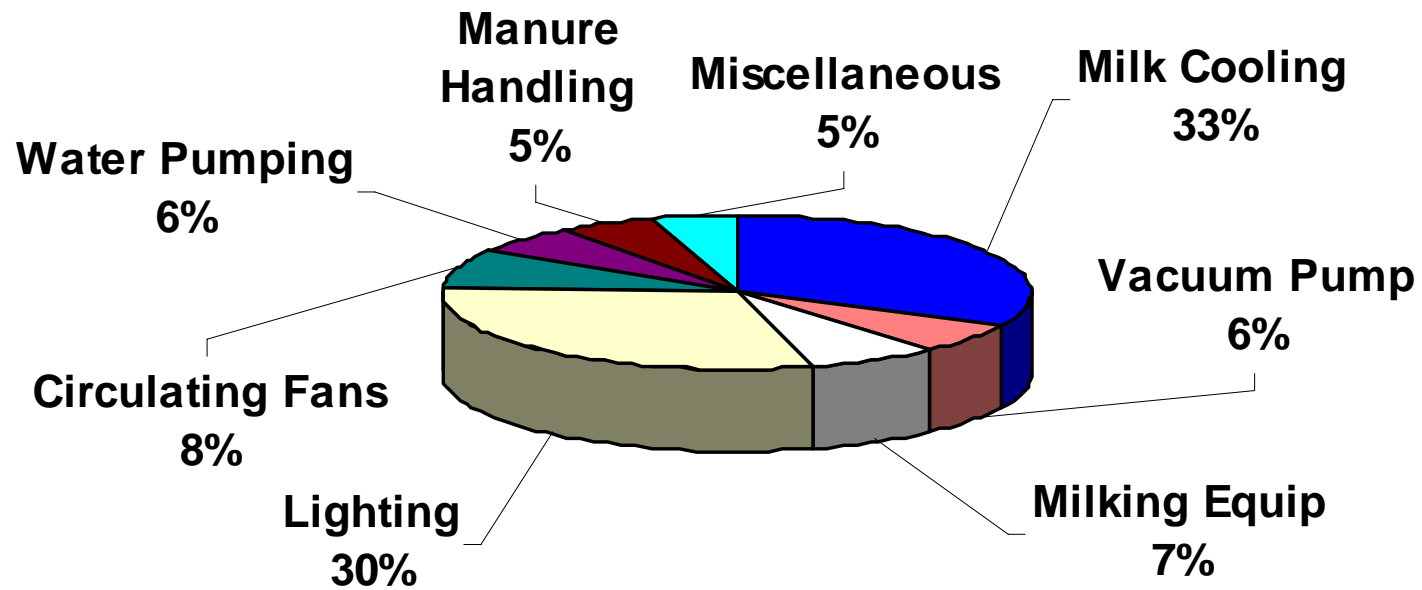


## Farm Monthly Demand (kW) Profile



2004 Monthly Energy Demand and Cost					
2004 Month	Demand kW	On Peak kWh	Off Peak kWh	Total Energy kWh	Energy Cost \$\$
Jan	91.4	14,353	16,179	30,532	\$ 3,242.72
Feb	88.2	13,761	14,510	28,271	\$ 3,058.64
Mar	82.7	12,161	13,853	26,014	\$ 2,814.45
April	126.1	14,053	16,394	30,447	\$ 3,597.38
May	150.9	24,788	25,582	50,370	\$ 5,003.95
June	145.1	26,679	25,241	51,920	\$ 5,303.68
July	147.5	34,024	45,016	79,040	\$ 6,843.15
Aug	151.0	35,425	39,069	74,494	\$ 6,751.64
Sept	147.6	29,490	29,755	59,245	\$ 5,734.89
Oct	136.9	15,069	17,483	32,552	\$ 3,829.37
Nov	121.9	14,263	16,974	31,236	\$ 3,506.46
Dec	81.9	14,810	19,336	34,145	\$ 3,232.35
Annual Total	122.6	248,875	279,391	528,266	\$ 52,918.68
				Average kWh Cost	\$ 0.1002

## Electrical Energy Use by Equipment Category - Dairy Farm in Northern New York



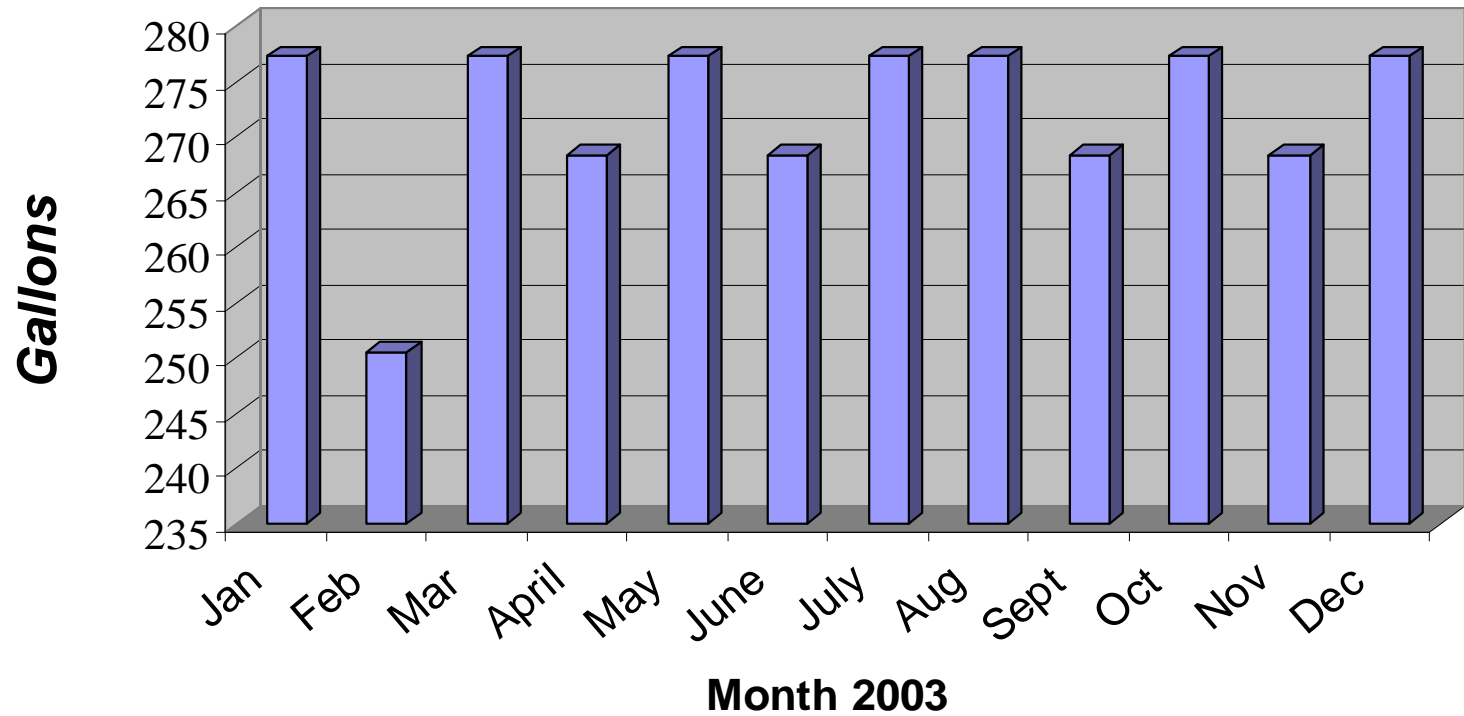
# Summary of Electrical Energy Use, Cost and EUI

Year	kWh/yr	Cost/yr	Cost/ kWh	No. Cows	EUI * kWh/ cow-yr
2002	490,636	\$46,080	\$0.0939	700	701
2003	528,266	\$52,919	\$0.1002	800	660

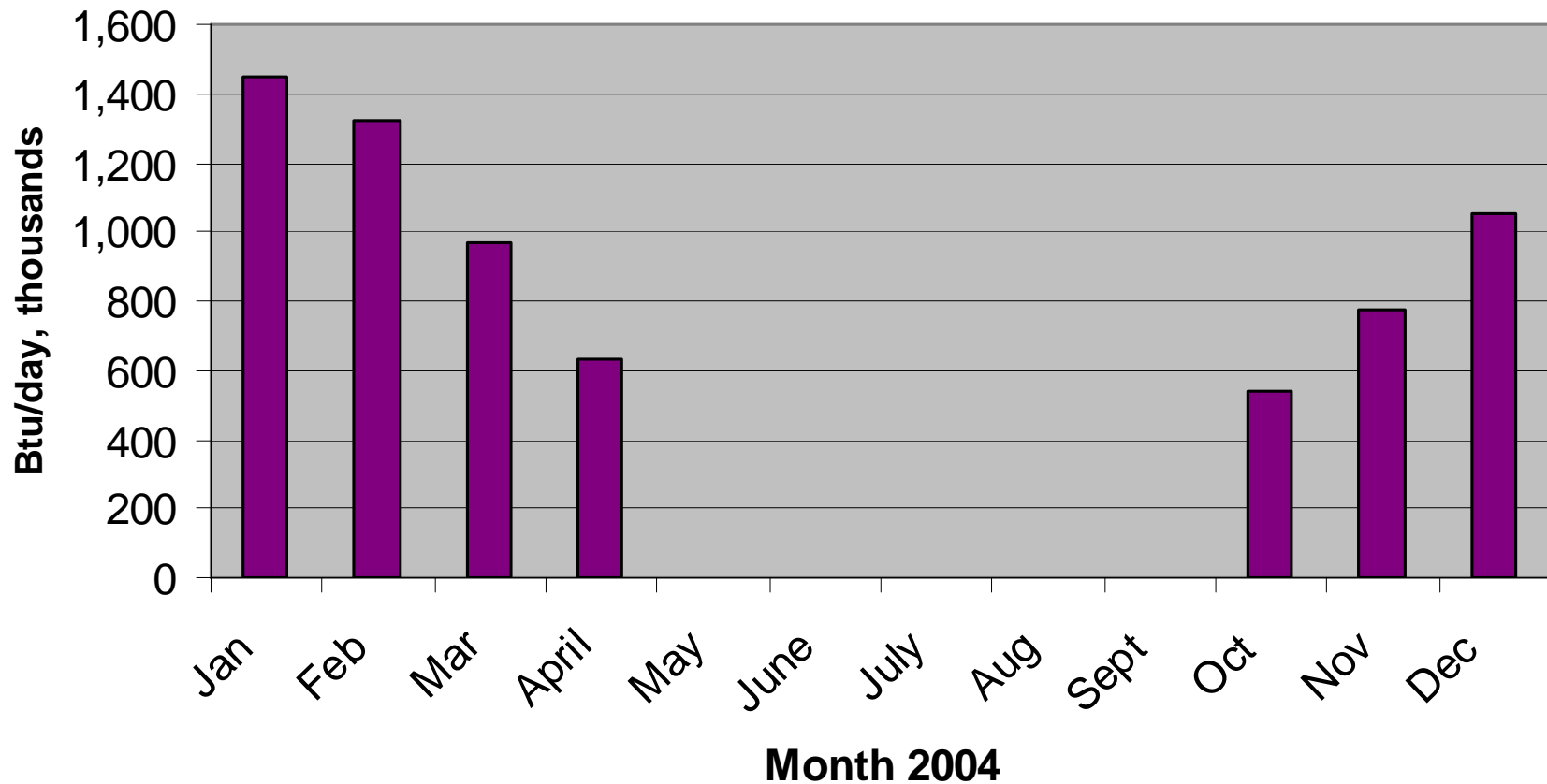
EUI – Energy Utilization Indices



## Farm - Monthly Profile of Fuel Oil Used for Water Heating in Milking Center



## Farm - Parlor Space Heating Profile with Propane



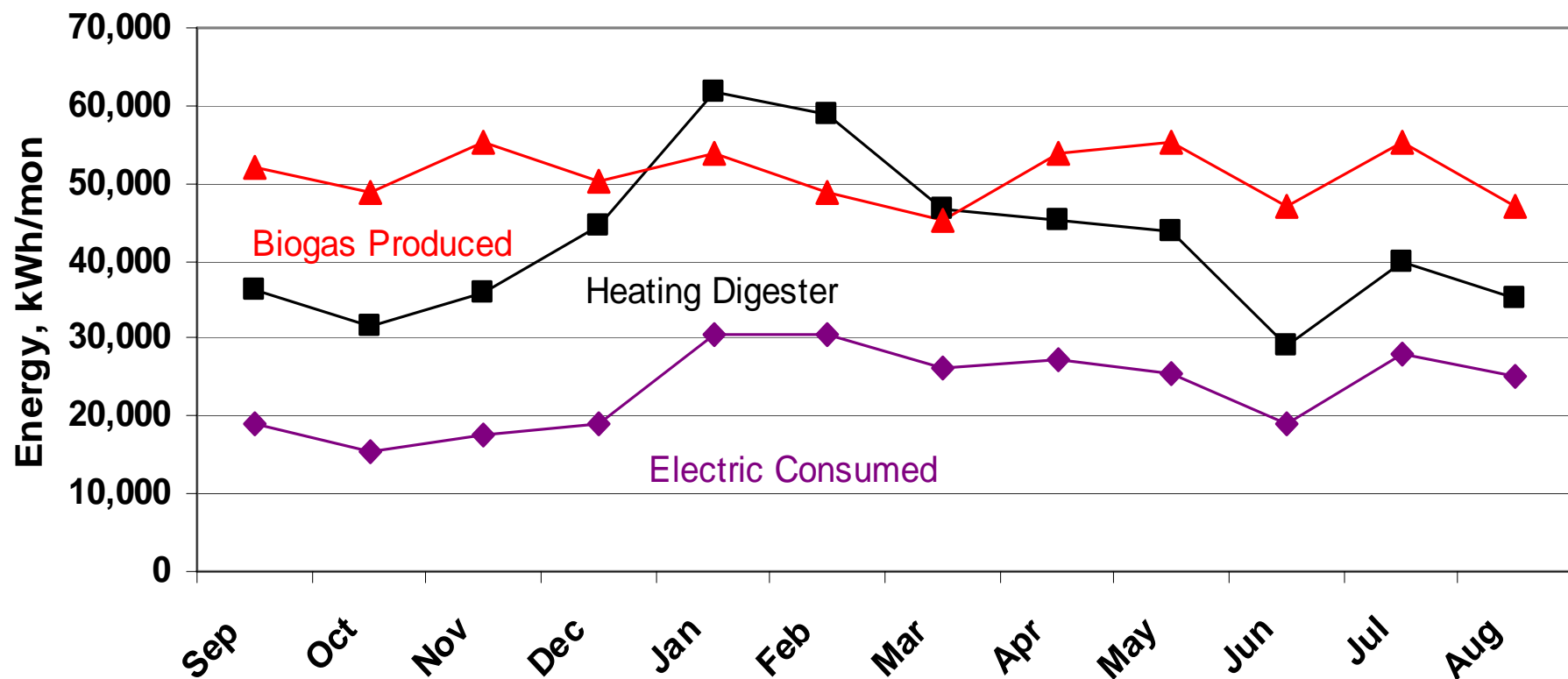
# Feasibility Study

- 1. Anaerobic Digester
- 2. Engine – Generator
- 3. Liquid – Solid Separation
- 4. Composter/drying

# Uses of Thermal Energy

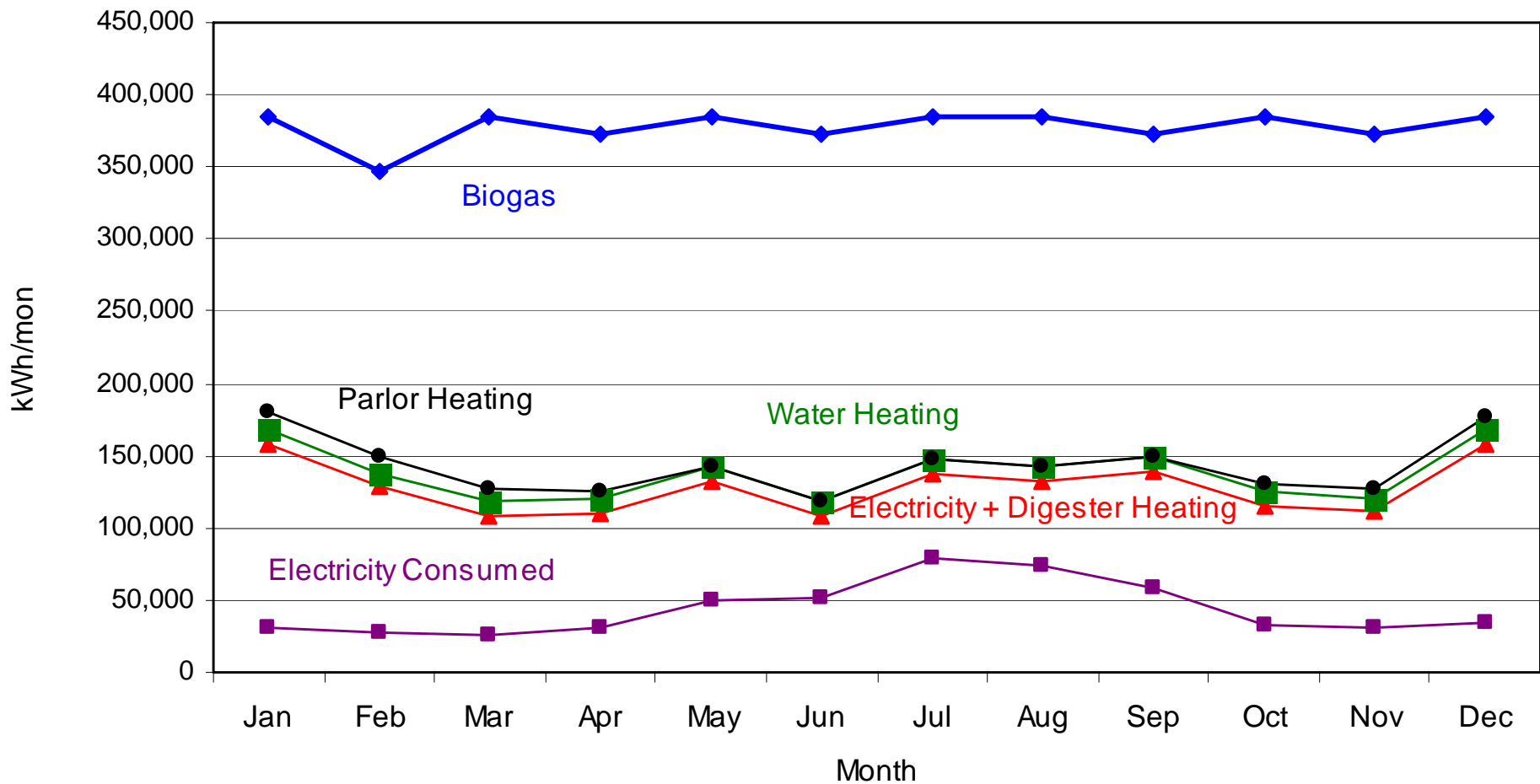
- Digester heating
- Thawing frozen manure
- Assisting with composting and drying manure
- Space heating
- Water heating

# Energy – Generating Farm Needs



DLtech, Inc.

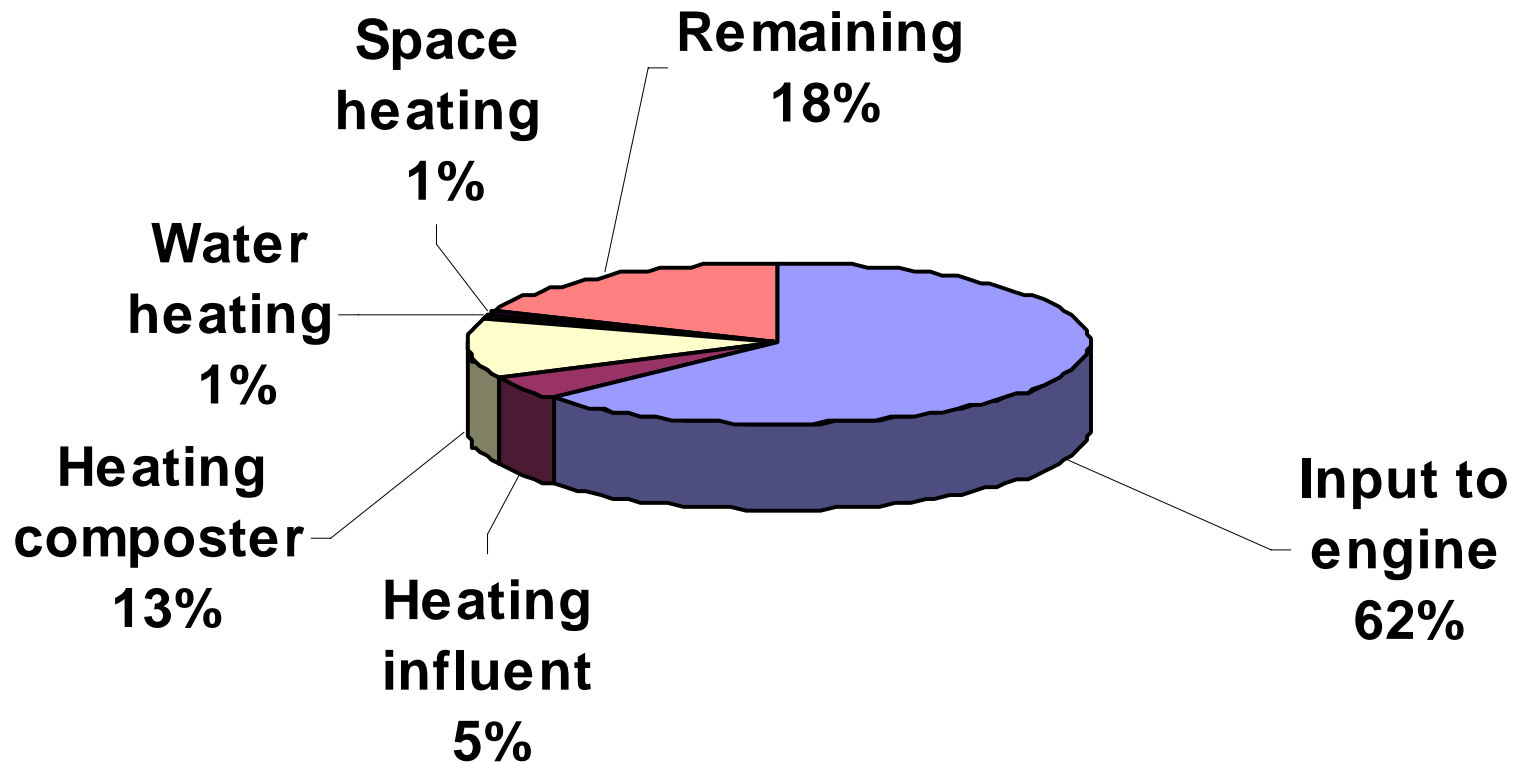
# Energy - Generating Farm Needs



# Analyzing Two Scenarios

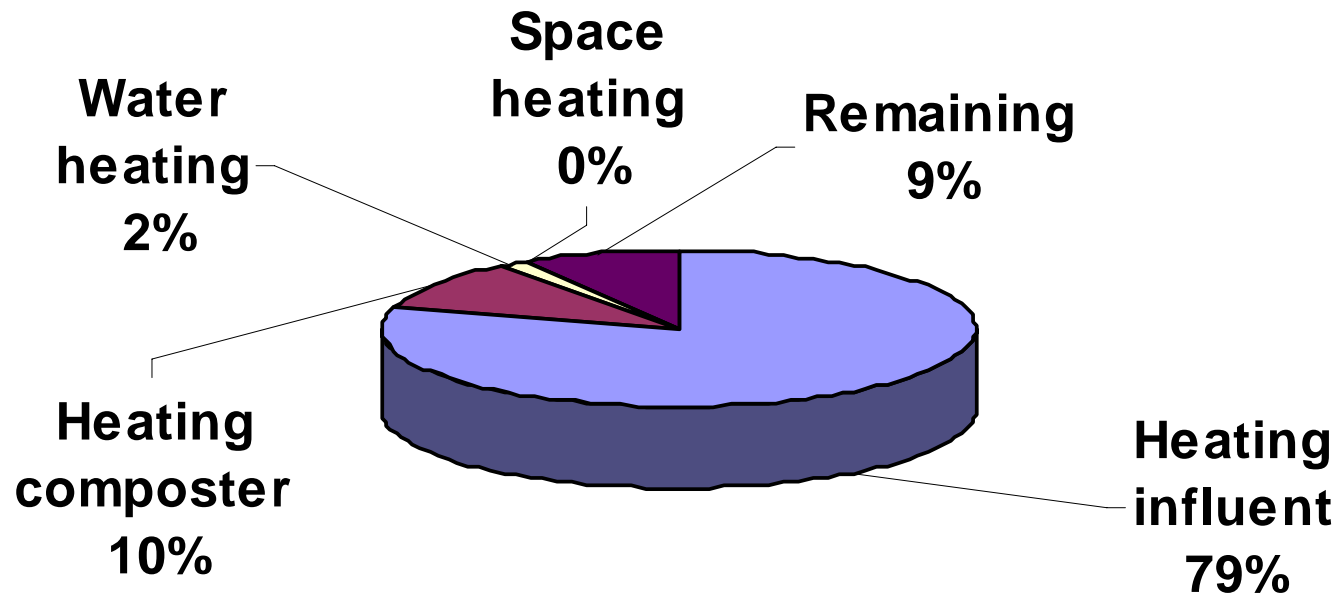
- 1. Generate On-Farm Needs for Electricity
- 2. Generate Maximum Electricity

## Distribution of Biogas, Generation On-Farm Needs

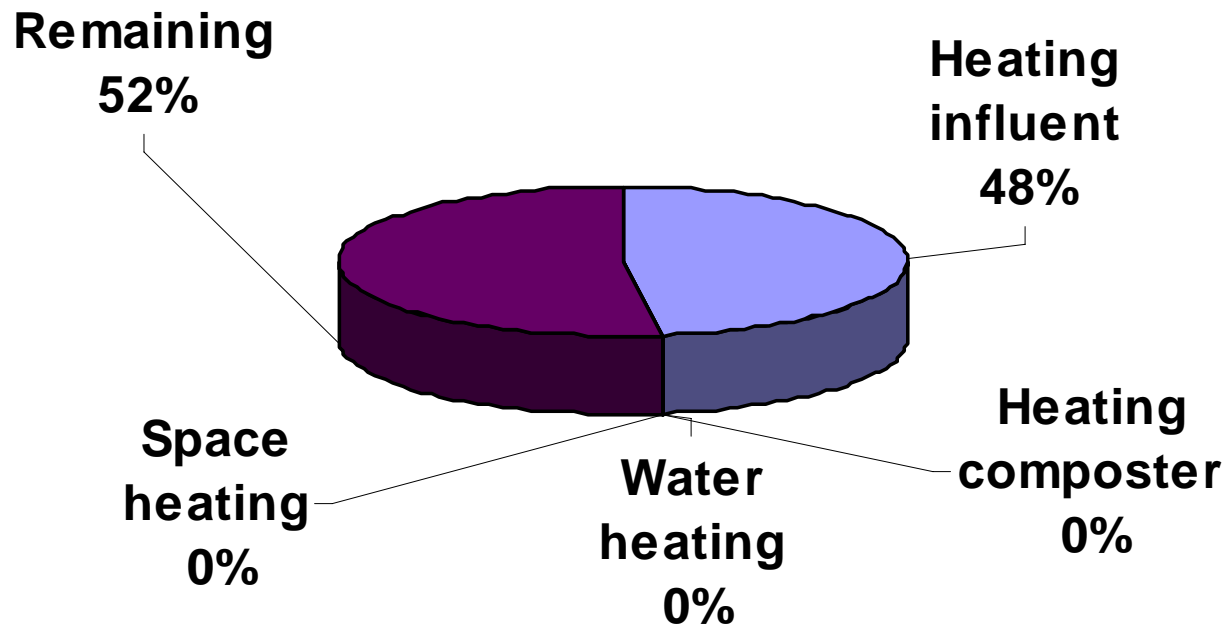




## Distribution of Water Jacket Energy, Generation On-Farm Needs



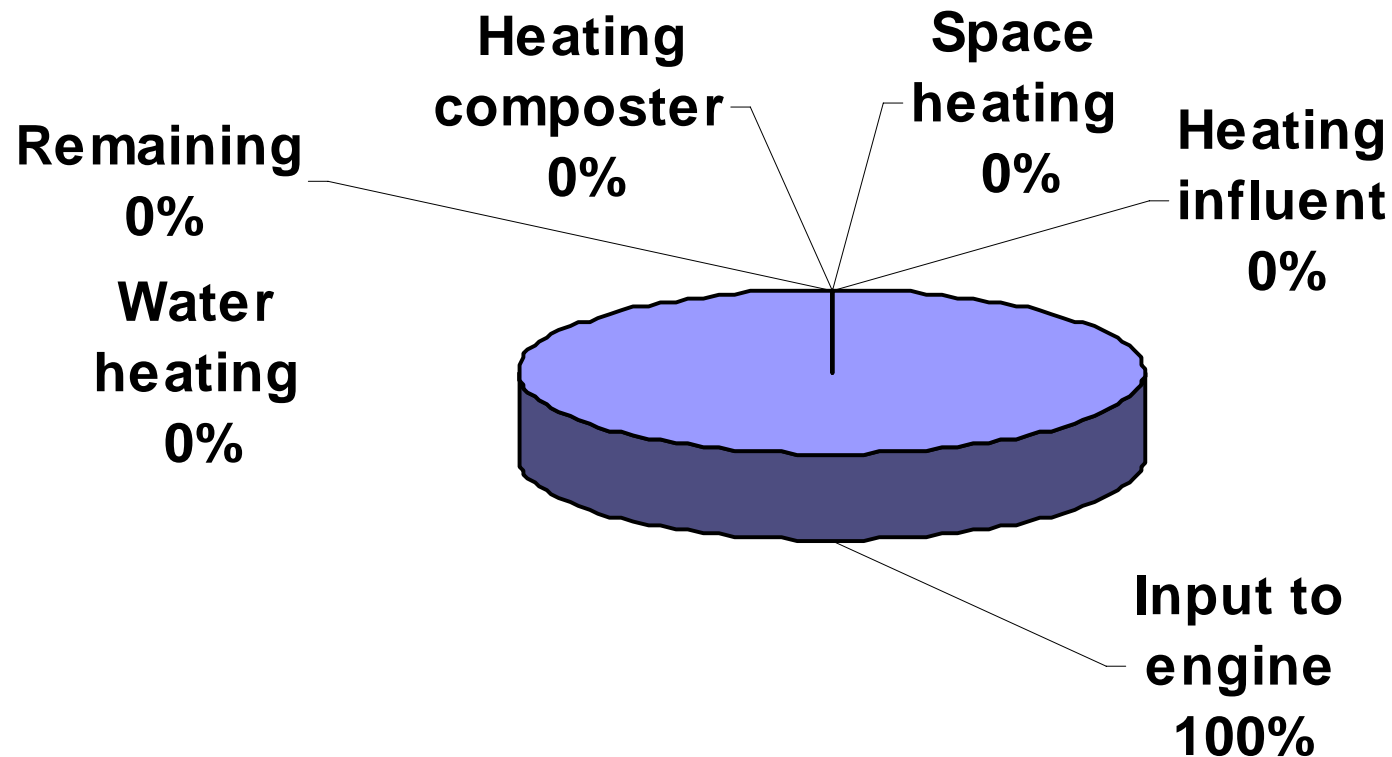
## Distribution of Exhaust Energy, Generating On-Farm Needs



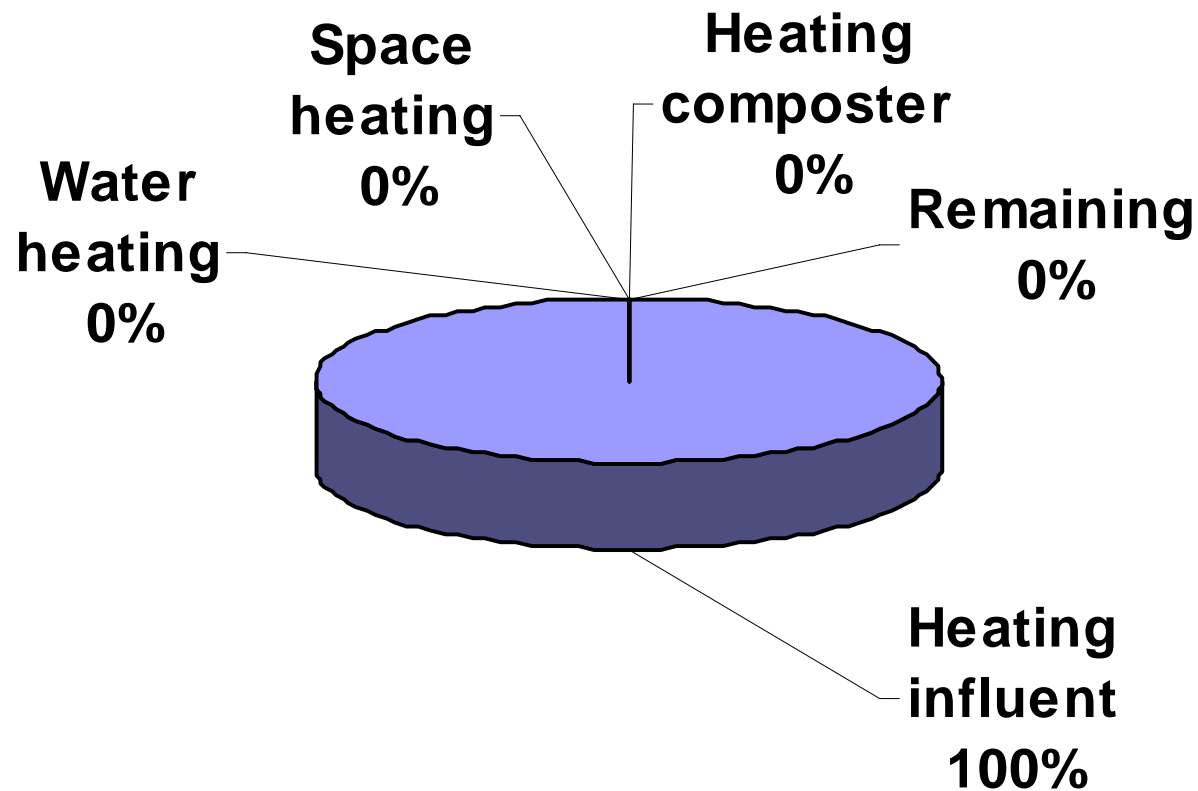
# Remaining Usable Energy, kBtu/day [Generating On-Farm Needs]

	Winter		Spring	Summer	Fall
Days	10	80	92	92	91
Energy Source	Frozen	Non-Frozen			
Biogas	3,900	11,500	15,700	4,600	15,200
Water jacket	0	0	0	4,200	0
Exhaust	0	0	0	2,700	0
Total	3,900	11,500	15,700	11,500	15,200

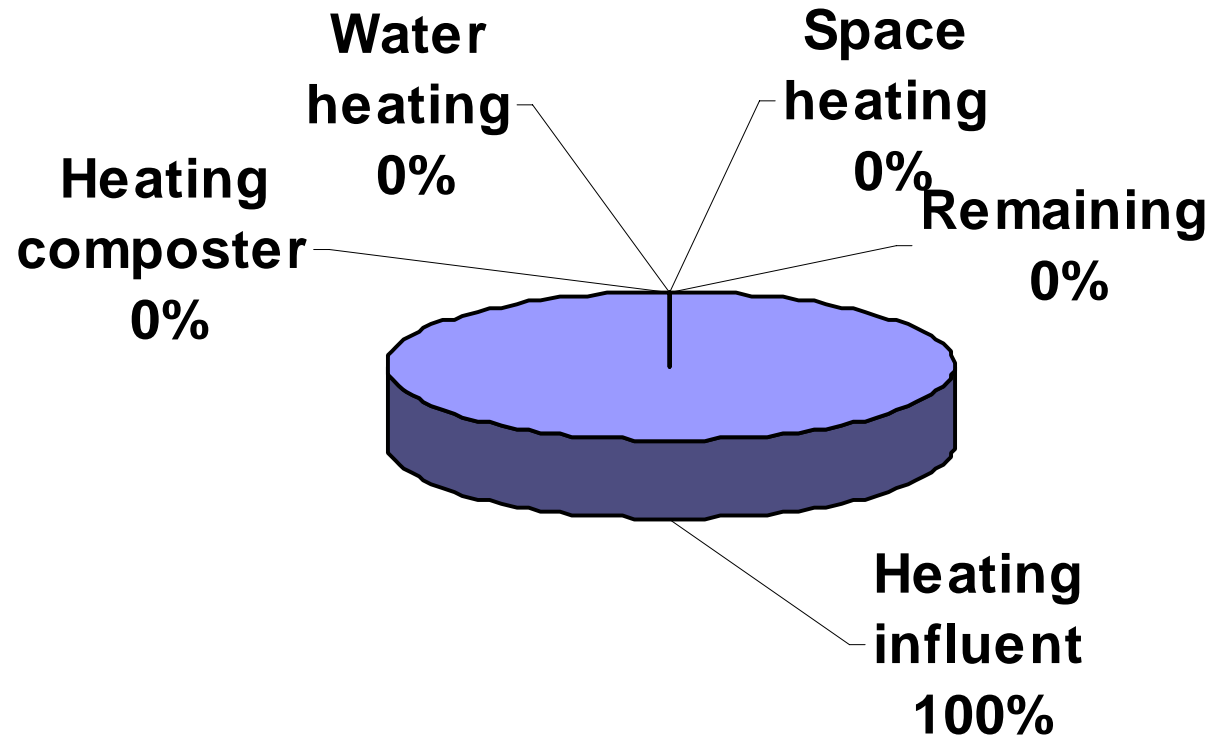
## Distribution of Biogas, Generating Max Electricity



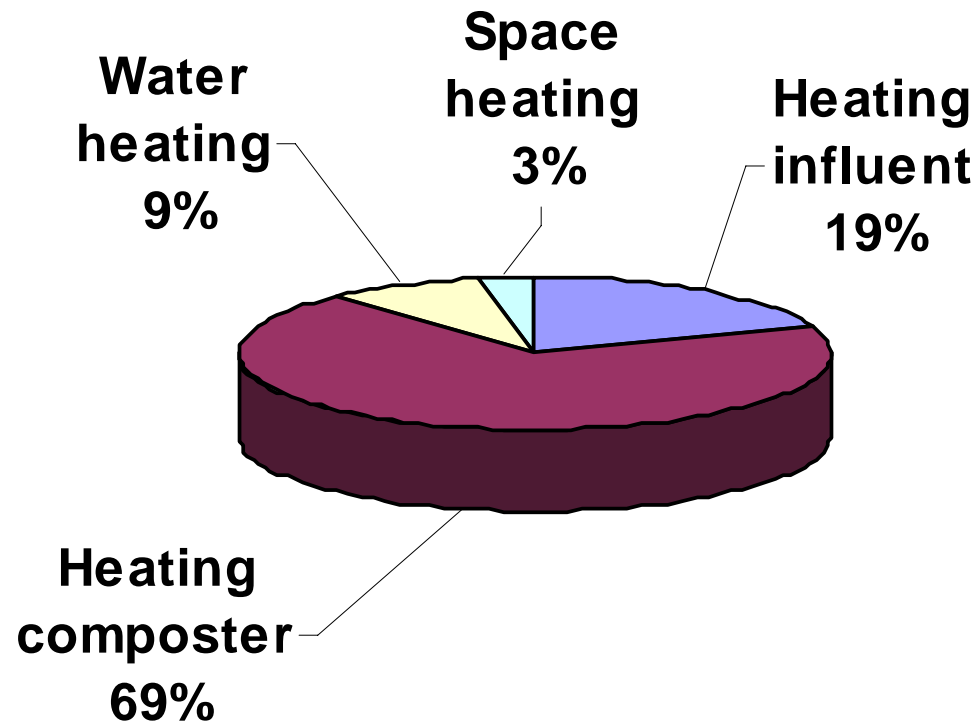
## Distribution of Water Jacket Energy, Max Electricity



## Distribution of Exhaust Energy, Max Electricity



## Distribution of Propane Use, Max Electricity



# Comparison of Two Scenarios

Item	Scenario 1 On-Farm Needs	Scenario 2 Max Generation
Electricity Off-set	528,000 kWh	528,000 kWh
Electricity Sold	0	322,000 kWh
Propane Purchased	0	26,000 Therms



In order to complete a detailed and accurate feasibility study for an anaerobic digester one must data from a comprehensive energy audit.

Thank you for your kind attention

Question?